Module 4b: Microbiological Sampling—Salmonella

Goal To inform inspectors of the regulatory and operational requirements that apply to *Salmonella.*

Objectives After completing this module portion, participants will be able to:

1. Explain why *Salmonella* testing is used.
2. Explain the difference between process microbiological control guidelines and performance standards.
3. State who will conduct *Salmonella* testing.
4. List the species and types of product that must be tested.
5. List the sampling sites for cattle, swine, and turkeys. Name the method used to sample chickens.
6. State what determines the compliance dates for *Salmonella* testing.

Discussion

You know that the new rule also requires that *Salmonella* testing be conducted in plants. To show that HACCP-based process control systems are achieving acceptable food safety levels, the Agency has set *Salmonella* performance standards for raw meat and poultry and for ground products. The goal of the *Salmonella* testing program is to verify that each establishment's pathogen reduction performance meets the current *Salmonella* standards. To meet the standards, each establishment must reduce *Salmonella* contamination on its meat and poultry products to a level below the current national baseline. To maintain inspection, establishments must consistently meet the standard. By requiring establishments to meet the standards FSIS intends to reduce the incidence of *Salmonella* and other enteric pathogens on raw meat and poultry products nationwide.

You might be wondering what the differences are between *Salmonella* testing and *E. coli* testing. Although there are some common aspects of the testing programs, there are two major differences. First, with *Salmonella* testing performance standards are set for industry. *E. coli* testing sets performance criteria. Performance standards are regulatory requirements, enforceable by FSIS. When HACCP is implemented, establishments must consistently meet the *Salmonella* performance standards as a condition of maintaining inspection. *E. coli* performance criteria, on the other hand, are only guidelines used by the plant to indicate how well process controls for contamination are working. Criteria are not enforceable by FSIS.

A second difference is who collects the sample. You remember that plant employees must collect carcass samples for *E. coli* testing. For *Salmonella* testing FSIS inspectors will collect both carcass and ground product samples.

Let's talk a little about how the *Salmonella* testing program evolved. To protect the consumer from contaminated products, especially from fecal contamination, the Agency searched for an organism that could be detected using modern microbiological techniques. *Salmonella* was selected as the target organism because it's the most

common cause of foodborne illness associated with meat and poultry products. It's present to varying degrees in all major species. Also, current methodologies can recover *Salmonella* from a variety of meat and poultry products. It was obvious that slaughter dressing interventions targeted at reducing *Salmonella* might also be beneficial in reducing contamination by other enteric pathogens.

Of course, the *Salmonella* standards in the regulations were based on a national baseline study conducted by the Agency. According to that study, 80% of the plants in the United States already meet the standard. FSIS believes all establishments can meet or do better than the current baseline prevalence for *Salmonella* contamination by taking care of process controls that prevent contamination and by using food safety technologies and procedures to remove contamination.

FSIS requires that beef, swine, chicken, and turkey carcasses are sampled for *Salmonella* testing.

Ground products, which consists of ground beef, fresh pork sausage, and ground chicken and turkey, are also sampled.

Sponge sampling is conducted on beef, swine, and turkey. Sponging sites are the same as those used for *E. coli* sampling. Recall that for beef the sample sites are the flank, the brisket, and the rump. For swine, they are the belly, ham, and jowl. And for turkey, the two sample sites are the back and the thigh. Chickens are sampled using the whole bird rinse. A ground sample consists of 25 grams of the ground product.

Because *Salmonella* is more likely to be present on raw, ground, or comminuted products than on the carcasses from which they are derived, raw, ground, or comminuted product is the focus of FSIS compliance testing in establishments that slaughter and produce raw ground product.

The *Salmonella* testing program will be implemented in two phases: a pre-implementation phase, followed by a compliance phase. During pre-implementation, FSIS will take about 250 samples from each establishment over a one-year period. Pre-implementation testing should be completed before the date performance standards are implemented in each establishment, that is, before the compliance phase begins.

Slaughter establishments and establishments producing raw, ground, and comminuted product must meet the *Salmonella* standard at the same time the establishment implements HACCP. HACCP implementation is based on establishment size. Large establishments, which produce 74%, by weight, of the nation's slaughter production, will be under HACCP and under the *Salmonella* performance standard by January 1998.

This is how *Salmonella* testing will work. Each month, the IIC will receive a schedule of products to test throughout the month from Headquarters. FSIS will sample each category of raw product on an unannounced basis according to the schedule. Each sample will be tested for *Salmonella*. The number of positive test results will be compared to the maximum number of positive results permitted by regulation for that product. Did you notice that *Salmonella* test results are reported differently than *E. coli* test results? *E. coli* results were a quantitative amount for the bacteria, that is, results were reported in specific numbers. *Salmonella* test results, however, only report the presence of the organism, not the number of organisms. If any *Salmonella* is found the test result is positive.

SALMONELLA PERFORMANCE STANDARDS

Class of product	Performance Standard (percent positive for Salmonella)	Number of samples tested (n)	Maximum number of positives to achieve Standard (c)
Steers/heifers	1.0	82	1
Cows/bulls	2.7	58	2
Ground beef	7.5	53	5
Hogs	8.7	55	6
Fresh pork sausages	N/A	N/A	N/A
Broilers	20.0	51	12
Ground chicken	44.6	53	26
Ground turkey	49.9	53	29
Turkeys	N/A	N/A	N/A

As mentioned, the performance standards specify a maximum number of positive test results (c) permitted in a specified number of samples (n) for each species and category of raw product. Here's how to use this table from the regulations. Consider steers and heifers. The performance standard is set at 1%. To meet the standard an establishment can have no more than one positive sample result out of every 82 carcasses sampled.

FSIS will keep records of *Salmonella* test results, just as plant employees keep records of *E. coli* test results. Unlike *E. coli* test records, there's no moving window for *Salmonella* test results. In our example of steers and heifers, each set of 82 tests stands alone.

The pathogen reduction performance standard applies to establishments, not to individual products. Products are not tested to determine their disposition, but rather to measure the effectiveness of the process in limiting *Salmonella* contamination. If an establishment fails to meet the standard, it must take corrective actions to lower the incidence of *Salmonella* on all the product of that type it produces. The effectiveness of the corrective action is then measured by subsequent testing. Another positive test result would show that the corrective action wasn't effective. A negative result would show that it was.

If an establishment continues to fail to meet the product performance standard, it must ultimately stop producing that product. We'll discuss more about what happens when the plant fails to meet *Salmonella* performance standards in Session II of this training.

The *Salmonella* pathogen reduction standards and *E. coli* performance criteria are likely to change as FSIS updates data resulting from follow-up in-plant tests. The test result targets currently reflect what is achievable using today's technology.